Circle whose Diameter is $\frac{R}{I} \times \frac{S\ cub.}{D\ quad.}$ very nearly, as I gather by computing the Errors of the Rays by the method of infinite Series, and rejecting the Terms whose quantities are inconsiderable. As for instance, if the Sine of Incidence I, be to the Sine of Refraction R, as 20 to 31, and if D the Diameter of the Sphere to which the Convex side of the Glass is ground, be 100 Feet or 1200 Inches, and S the Semidiameter of the aperture be two Inches, the Diameter of the little Circle (that is $\frac{R \times S\ cub.}{I \times D\ quad.}$) will be $\frac{31 \times 8}{20 \times 1200 \times 1200}$ (or $\frac{31}{3600000}$) parts of an Inch. But the Diameter of the little Circle through which these Rays are scattered by unequal refrangibility, will be about the 55th part of the aperture of the Object-Glass which here is four Inches. And therefore the Error arising from the spherical Figure of the Glass, is to the Error arising from the different Refrangibility of the Rays, as $\frac{31}{3600000}$ to $\frac{4}{55}$ that is as 1 to 8151 : and therefore being in Comparison so very little, deserves not to be considered.

But you will say, if the Errors caused by the different refrangibility be so very great, how comes it to pass that Objects appear through Telescopes so distinct as they do ? I answer, 'tis because the erring Rays are not scattered uniformly over all that circular space, but collected infinitely more densely in the Center than in any other part of the Circle, and in the way from the Center to the Circumference grow continually rarer and rarer, so as at the Circumference to become infinitely rare; and by reason of their rarity are not strong enough to be visible, unless in the Center and very near it. Let ADE represent one of those Circles described with the Center C and Semidiameter AC, and let BFG be a smaller Circle concentric to the former, cutting with

Fig. 27.

with its Circumference the Diameter AC in B, and bisect AC in N, and by my reckoning the density of the Light in any place B will be to its density in N, as AB to BC; and the whole Light within the lesser Circle BFG, will be to the whole Light within the greater AED, as the Excess of the Square of AC above the Square of AB, is to the Square of AC. As if BC be the fifth part of AC, the Light will be four times denser in B than in N, and the whole Light within the less Circle, will be to the whole Light within the greater, as nine to twenty five. Whence it's evident that the Light within the less Circle, must strike the sense much more strongly, than that faint and dilated light round about between it and the Circumference of the greater.

But its further to be noted, that the most luminous of the prismatick Colours are the Yellow and Orange. These affect the Senses more strongly than all the rest together, and next to these in strength are the Red and Green. The Blue compared with these is a faint and dark Colour, and the Indigo and Violet are much darker and fainter, so that these compared with the stronger Colours are little to be regarded. The Images of Objects are therefore to be placed, not in the Focus of the mean refrangible Rays which are in the confine of Green and Blue, but in the Focus of those Rays which are in the middle of the Orange and Yellow; there where the Colour is most luminous and fulgent, that is in the brightest Yellow, that Yellow which inclines more to Orange than to Green. And by the Refraction of these Rays (whose Sines of Incidence and Refraction in Glass are as 17 and 11) the Refraction of Glass and Crystal for optical uses is to be measured. Let us therefore place the Image of the Object in the Focus of these Rays, and all the Yellow and Orange will fall within a Circle, whose Diameter is about the 250th part of the Diameter of the aperture